Research
Research Laboratory & Safety Services

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Flammables Hazard Class
Standard Operating Procedure

1. Purpose

This standard operating procedure (SOP) is intended to provide guidance on how to safely work with flammable chemicals in a University of Arizona (UA) laboratory. Laboratory personnel should review this SOP, as well as the appropriate Safety Data Sheet(s) (SDSs), before using flammable chemicals. If you have questions concerning the requirements within this SOP, contact the Approval Holder (AH)/Approval Safety Coordinator (ASC), or the Research Laboratory & Safety Services (RLSS).

2. Scope

This hazard class SOP only addresses safety issues specific to the flammable hazard of a chemical; several hazard class SOPs may be applicable for a specific chemical. For the purposes of laboratory safety, both flammable and combustible liquids are considered to be in the "Flammable" hazard class, and are covered under this SOP.

3. Hazard Description

Flammable chemicals are easily ignited and are capable of burning rapidly. The following flammability hazards are included in this SOP:

- Flammable gas
- Flammable aerosol
- Flammable liquid
- Flammable solid
- Combustible liquid

Common flammable chemicals include acetone, ethanol, cyclohexane, and methanol. The flammability of a liquid chemical will depend on its flash point, or the temperature at which an organic compound gives off sufficient vapor to ignite in air. The lower the flash point, the more flammable the chemical. Flash points are commonly found on the chemical's SDS.

4. General Control of Hazards

The following general control measures should be implemented whenever using or handling flammable chemicals:

- Keep away from heat, sparks, open flames and hot surfaces.
- Never heat flammable chemicals with an open flame. If the temperature must be increased, use an oil or water bath.
- Avoid using ignition sources (e.g. Bunsen burners, hot plates, oil baths, electrical equipment with frayed or cracked wiring, etc.) in areas where highly flammable (i.e. low flash point) chemicals are used.
- Avoid creating static electricity in areas where highly flammable chemicals are used.

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- Keep the containers of flammable chemicals tightly closed at all times when not in use to prevent accumulation of flammable vapors.
- Ensure proper grounding. Be sure to ground metal containers when transferring flammable liquids.
- Do not pierce or burn pressurized containers of flammable aerosols, even after use.

5. Engineering Controls

Flammable and combustible chemicals should be used in a chemical fume hood (or other similarly ventilated area) whenever possible. This is especially true for highly flammable chemicals, large quantities (> 500mL) of flammable chemicals, or when using flammable chemicals at increased temperature or pressure.

Fire extinguishers should be immediately available in the laboratory when working with flammable chemicals. Ensure the fire extinguisher is appropriate for the chemicals used; the wrong fire extinguisher may not work against a fire, or worse, may make the fire larger. Type ABC fire extinguishers are appropriate for most laboratory settings, but a Class D fire extinguisher is required for fires involving combustible metals (e.g. magnesium, titanium, sodium, potassium).

6. Personal Protective Equipment

At a minimum, all laboratory workers must wear safety glasses, long pants, closed-toed shoes, a laboratory coat and examination gloves when working with hazardous chemicals in a laboratory.

Laboratory personnel working with large quantities of flammable chemicals, or with any quantity of a flammable chemical near an ignition source, must wear a 100% cotton or flame-resistant laboratory coat. A poly/cotton blend laboratory coat will not protect your skin against flammable hazards. If the splashing of flammable liquids is a possibility during your work, splash goggles must be worn instead of safety glasses.

7. Handling and Storage Requirements

Store flammable materials in a well-ventilated place and keep them cool. Segregate flammable chemicals from incompatible materials, such as oxidizers, corrosives, combustibles, etc. In laboratories or storage rooms where more than 10 gallons of flammable chemicals are stored, these chemicals must be stored in an approved flammable storage cabinet. Ensure there are no combustible materials (e.g. paper, cardboard, etc.) also stored in flammable storage cabinets that may act as fuel for a fire. A maximum of 60 gallons of flammable liquid may be stored within a single flammable storage cabinet, and no more than 3 flammable storage cabinets may be kept in a laboratory/fire area. An exception to this rule exists if the storage room qualifies as an “inside storage room” per International Fire Code. Contact the RLSS for further information on inside storage rooms.

If a flammable chemical must be kept below room temperature, the refrigerator/freezer used for storage must be an approved explosion-proof or modified-domestic device. Flammable chemicals should not be stored in regular, domestic refrigerators/freezers.

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Flammable chemicals must be transported in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier. Suitable fire control devices (e.g. fire extinguishers) must be available in laboratories or storage rooms where flammable or combustible chemicals are located.

8. Waste Disposal

Waste flammable chemicals should be collected in compatible waste containers (i.e. plastic 3.5 gallon buckets) and segregated from incompatible chemicals. Contact Risk Management Services for further information on the disposal of flammable chemicals.

9. Spill and Incident Procedures

If a spill of flammable chemicals constitutes a major spill (e.g. it occurs near an ignition source), do not attempt to clean the spill yourself. Evacuate the area and follow the procedures illustrated in the University Chemical Hygiene Plan section on major chemical spills. Inform the RLSS of all major chemical spills.

In the case of an explosion or fire in the laboratory, leave the area immediately and call 911 from a campus phone, or call 911 from a non-campus phone and mention the incident is on the UA campus.

If a laboratory worker is injured or exposed to flammable chemicals, immediately notify the AH/ASC. If a laboratory worker requires immediate medical attention, call 911. Remove contaminated clothing and immediately flush the contaminated areas with water for at least 15 minutes. For eye exposures, immediately remove contact lenses, if present, and flush the eyes with water for at least 15 minutes. Consult the chemical's SDS for more specific information on appropriate first aid. Inform the RLSS and Risk Management Services of the incident as soon as practicable.

10. Designated Area

Designated areas are not required for this hazard class. However, chemicals may belong to multiple hazard classes, and a flammable chemical may require a designated area if it belongs to a hazard class that includes particularly hazardous chemicals.